

# NOAA's Colorado Basin River Forecast Center

## Decision Support in the Cadillac Desert: *Water Supply Data and Tools in the Water Stressed and Politically Charged Colorado River Basin*

Brent Bernard, *Hydrologist*  
National Climate Services Meeting

May 10, 2016

Silver Spring, MD – Sheraton Silver Spring



# The Take Away

- The CBRFC services a broad range of stakeholders and sister agencies
  - Some with conflicting goals and viewpoints
  - Some with more technical expertise than other
  - ALL are concerned with the impacts of climate change
- Communication, collaboration, and education is essential to presenting data effectively
- Understanding needs, cultivating relationships, is key
- We play an important role in a *hydroclimatic community*

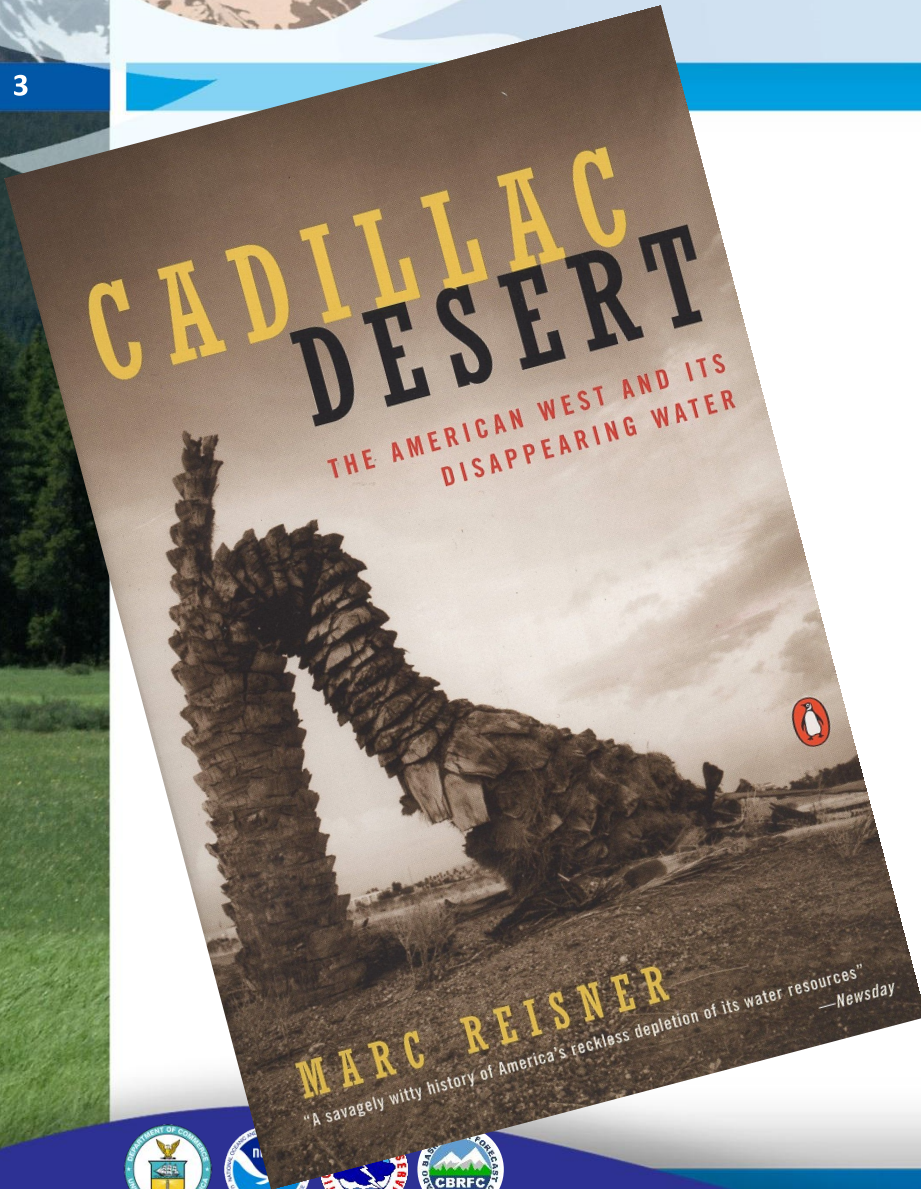


# The Cadillac Desert

3

Marc Reisner's 1986 seminal work detailed the contentious history of water management in the Colorado River Basin – Water in the West is unlike any other place in the world!

The contentious nature in the basin has softened, but there has never been a more important time to efficiently manage water resources – the CBRFC plays a big role in this.



# Who We Impact

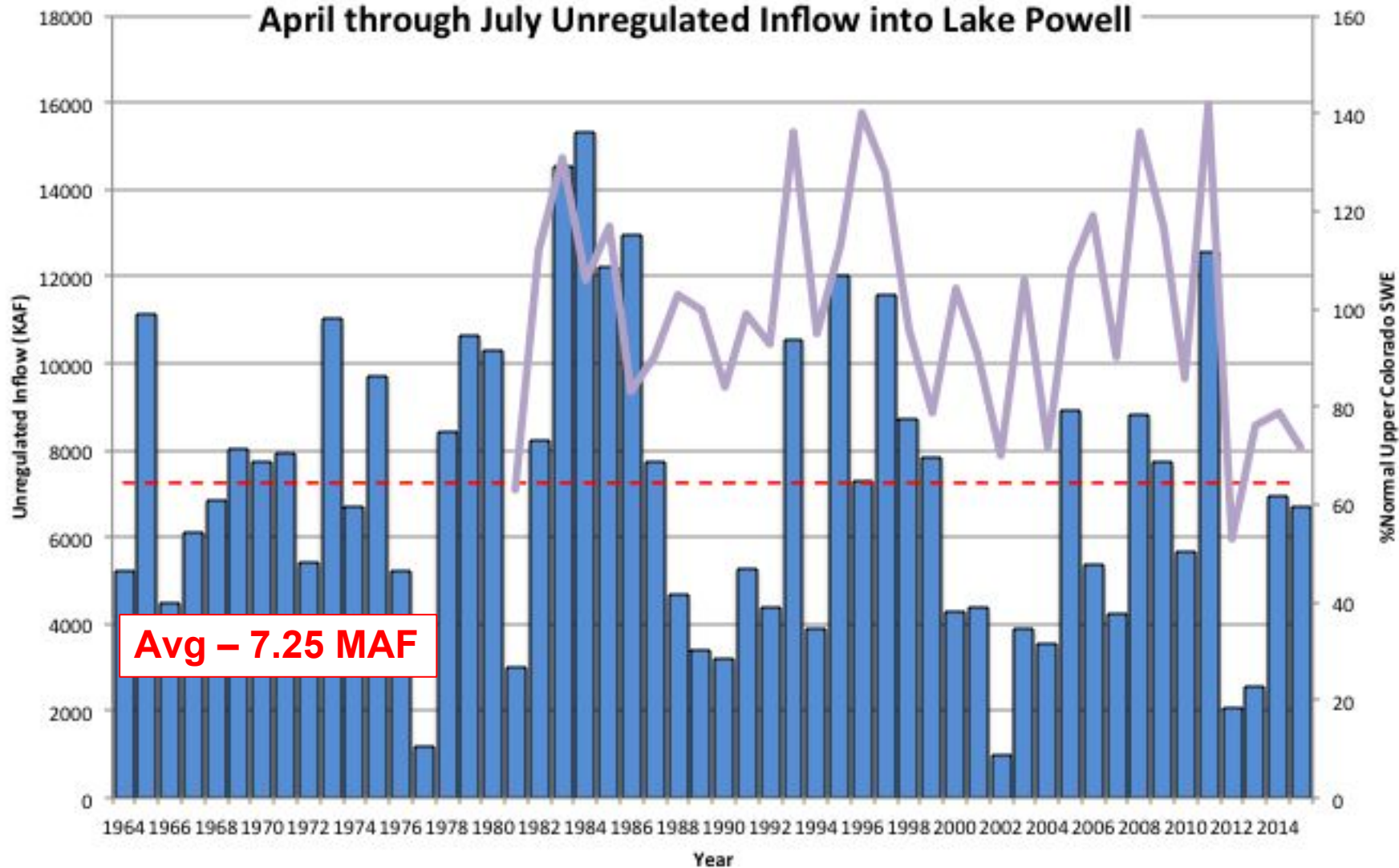


- 30 million people
- 4 million irrigated acres
- 4,200 MW Hydropower
- 15 Native American Tribes
- 16 National Lands
- 2 Nations
- About 15 MAF annually
- About 60 MAF worth of storage



## Hydroclimatic Variability over the Colorado River Basin

### April through July Unregulated Inflow into Lake Powell



# So. Much. Data.

6

- Gage Networks
  - USGS, and others, for Q
  - NRCS SNOTEL
  - Precip and Temp
- Radar Information
- Remotely Sensed Data
  - Snow Cover
  - Dust on Snow
- Forecasted Data
  - 5-Day QPF
  - 10-Day QTF
- Regulation
  - Diversions
  - Dam Operations
- Ensemble Information
  - 1981-2010
  - Adding more years soon!

# Times are Changing!

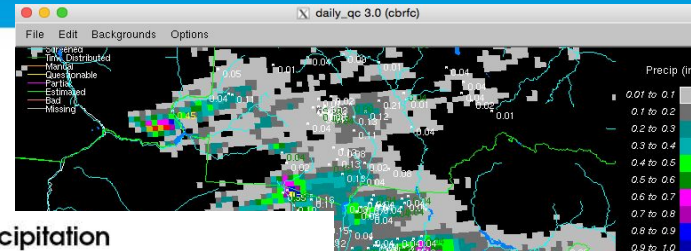
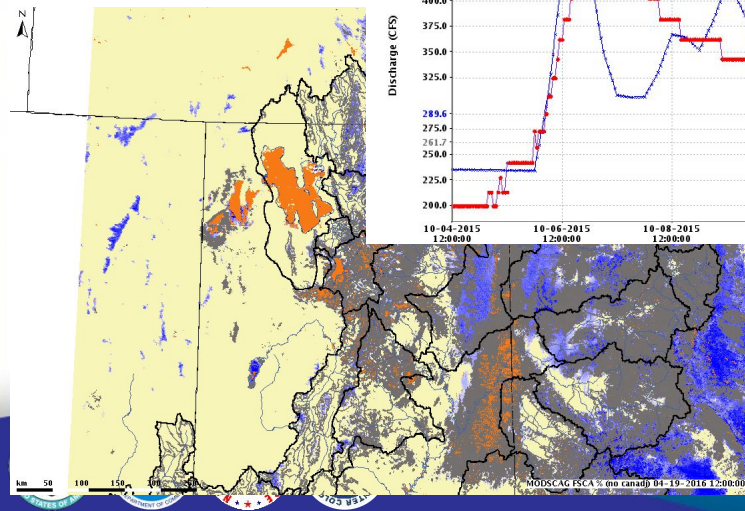
7

- Where we were:
  - What is THE forecast?
  - How much water is there?
  - How much snow is there?
  - Will there be flooding?
- Where we are going:
  - What is the range of forecasts?
  - What is the likelihood of reaching this flow?
  - What if it's a dry/wet year?
  - What is the risk to filling my reservoir?
  - What is your uncertainty?



# Providing Decision Support

8



Evapo- Precipitation

DRGC2H\_F: ANIMAS - DURANGO - Forecast

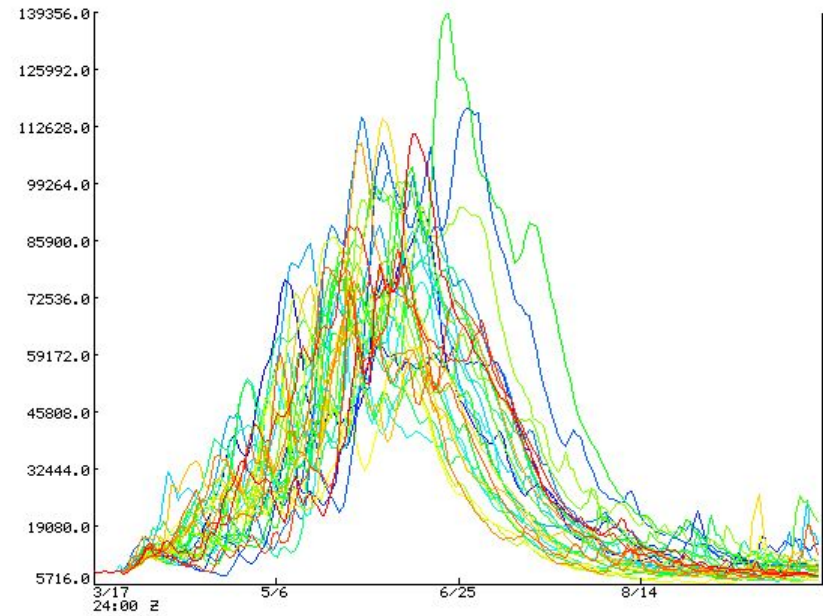


ESP Trace Ensemble of COLORADO - LAKE POWE

Latitude: 36.9 Longitude: -111.5

Forecast for the period 3/17/2014 24h - 10/1/2014 24h

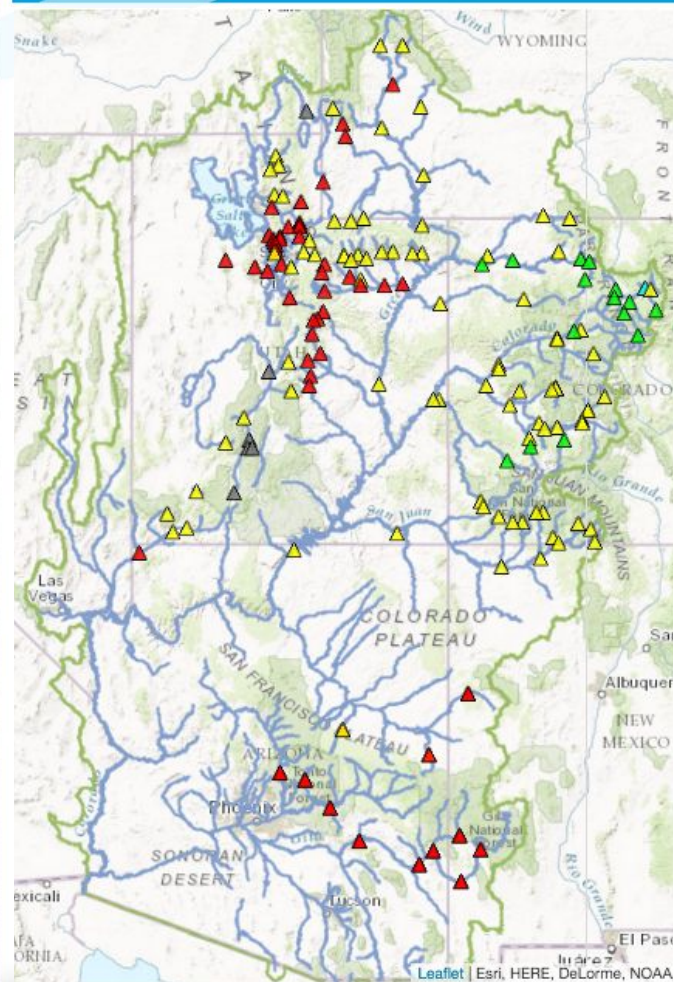
This is a conditional simulation based on the current conditions as of 3/17/2014





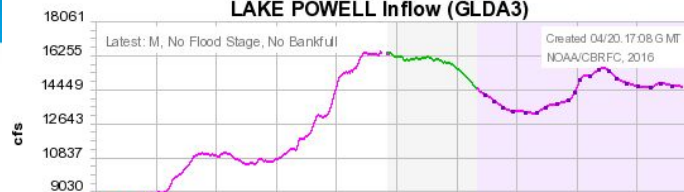
# Reaching our Stakeholders

9

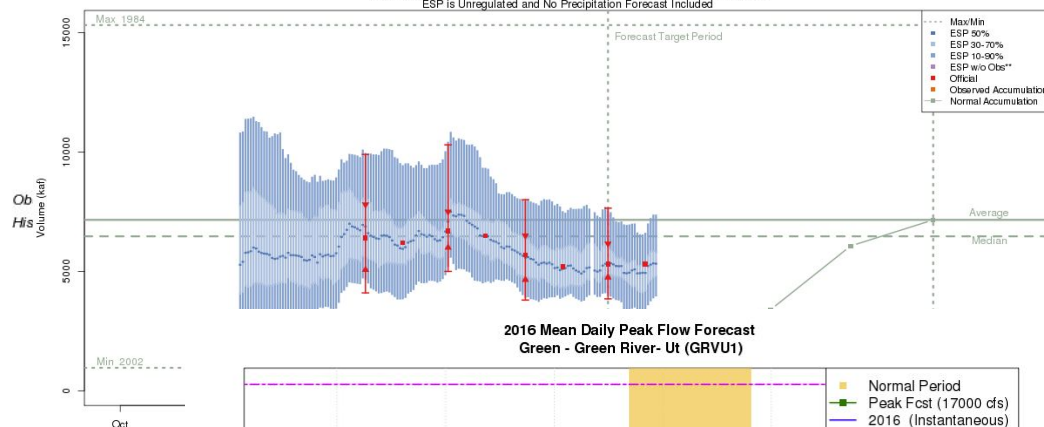


## Colorado Basin River Forecast Center

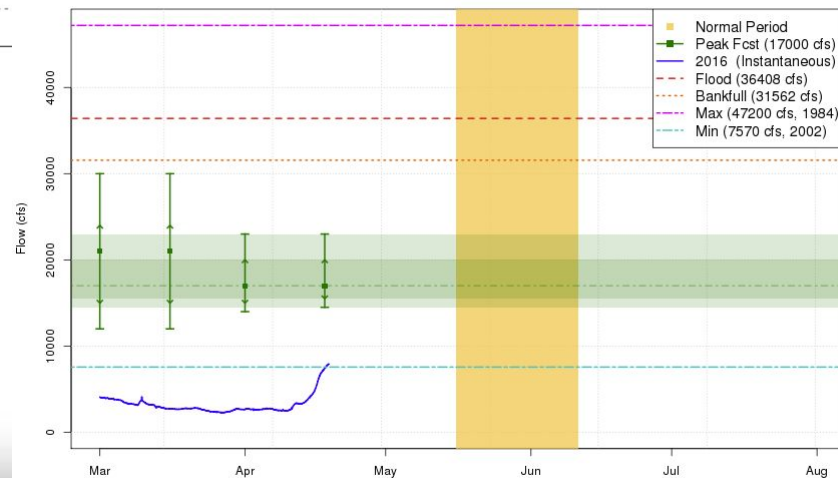
### LAKE POWELL Inflow (GLDA3)



Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)  
2016-04-15 Apr-Jul Official 50% Forecast: 5300 kaf (74% of average)  
ESP is Unregulated and No Precipitation Forecast Included



### 2016 Mean Daily Peak Flow Forecast Green - Green River- Ut (GRVU1)



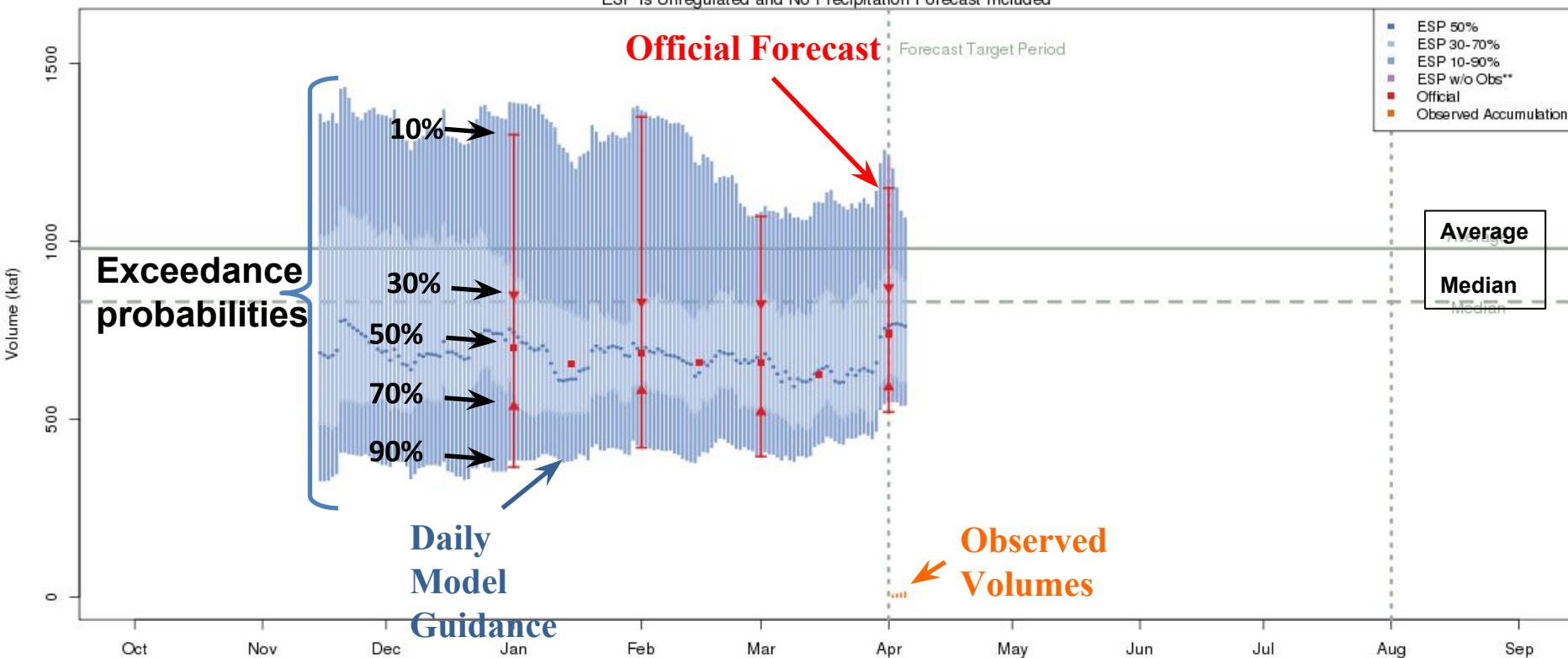
These graphics are updated approximately every two weeks between 3/1 and 5/1  
Plot Created 2016-04-18 15:23:43  
CBRFC / NWS / NOAA



# Reaching our Stakeholders

10

Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)  
2016-04-01 Apr-Jul Official 50% Forecast: 740 kaf (76% of average)  
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-04-05) 50% ESP forecast is 761 kaf.  
Plot Created 2016-04-05 16:58:50, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

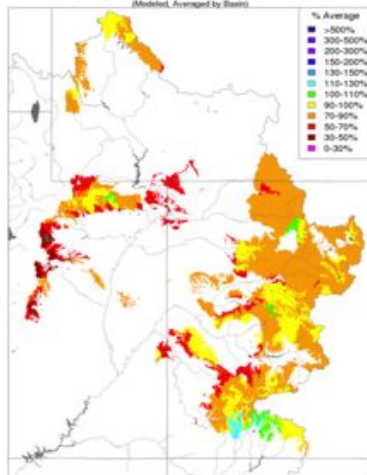




# Upper Colorado Situational Awareness

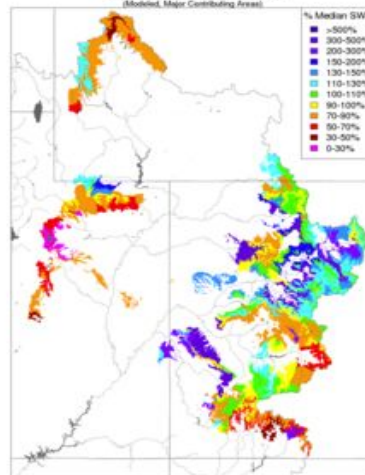
## Soil Moisture

Soil Moisture - Fall - 2015 (November 01)  
(Modelled, Averaged by Basin)



## Snow Conditions

Snow Conditions - April 20 2016  
(Modelled, Major Contributing Areas)



## Lake Powell Unregulated Inflow (kaf) Water Year 2016 Forecasts as of 2016-04-01

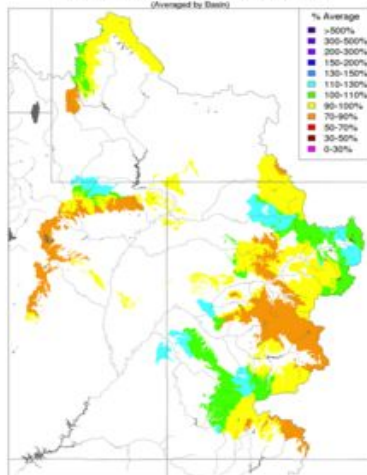
Period	Obs to Date	Full Fcst	%Avg
Apr-Jul	0	5300	74%
Water Year	2472	8442	78%

## Lake Powell %Average Precipitation Water Year 2016

Area	Oct	Nov	Dec	Jan	Feb	Mar	Water Year
UC-Powell	89	100	127	108	51	97	96

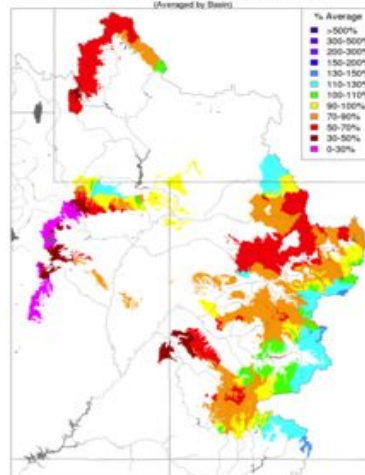
## Water Year Precipitation

Water Year Precipitation, October 2015 - March 2016  
(Averaged by Basin)

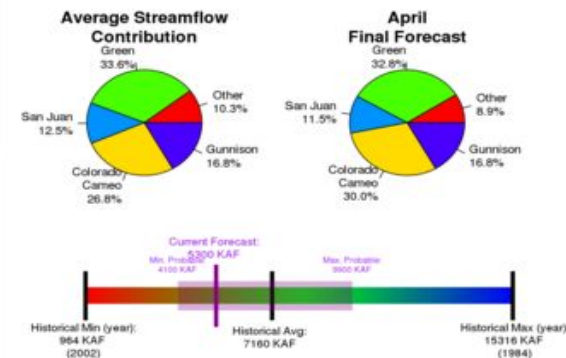


## Month to Date Precipitation

Month to Date Precipitation - April 20 2016  
(Averaged by Basin)



## April - July Unregulated Inflow into Lake Powell As of 2016-04-01



## More Information

Lake Powell Forecast Evolution Plot  
 Apr-July Text Forecast Product  
 Water Year Text Forecast Product  
 Snotel Group Plot  
 Snotel Group Data  
 USBR 24 Month Study



# Reaching our Stakeholders

12

- Open and consistent communication is key
  - Monthly webinars
  - Annual forum with stakeholders
  - Regular meetings with partner agencies
  - Easy contact with basin focal points
- Follow through on feedback and ideas!
- Facilitate conversations and collaboration, even when it's uncomfortable



# Challenges Ahead

13

- Climate Change
  - Past no longer representative of the future – how can we incorporate this into operations?
  - How can we partner better with the rest of NOAA and the NWS to produce better forecasts?
- Different needs for different stakeholders – Great Basin and the Lower Basin and the Upper Basin



# Questions?

